

REMARKS

The above amendments are made in response to the Office action of November 30, 2006. The Examiner's reconsideration is respectfully requested in view of the above amendment and the following remarks.

Claims 1-16 are pending and claims 6-16 are withdrawn from further consider. Claims 1 and 4 have been amended, leaving claims 1-7 for consideration upon entry of the present amendment. Support for the amendment to claim 1 may be found at least in FIGS. 1A-1C of the application as filed. No new matter has been added.

Claim Rejections Under 35 U.S.C. § 112

Claim 4 stands rejected under 35 U.S.C. § 112, second paragraph, as being allegedly indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. The Examiner states that it is unclear if the limitation "copper alloy layer" is different than the "metal layer".

Claim 4 has been amended to recite that "the copper alloy layer is a metal layer corresponding to a gate line, a source-drain electrode or a data line."

In light of the present amendment and above remarks it is respectfully requested that the Examiner withdraw the rejection to claim 4.

Claim Rejections Under 35 U.S.C. § 102

In order to anticipate a claim under 35 U.S.C. §102, a single source must contain all of the elements of the claim. *Lewmar Marine v. Barient, Inc.*, 827 F.2d 744, 747, 3 U.S.P.Q.2d 1766, 1768 (Fed. Cir. 1987), *cert denied*, 484 U.S. 1007 (1988). Moreover, the single source must disclose all of the claimed elements "arranged as in the claim." *Structural Rubber Prods. Co. v. Park Rubber Co.*, 749 F.2d 707, 716, 223 U.S.P.Q. 1264, 1274 (Fed. Cir. 1984). Missing elements may not be supplied by the knowledge of one skilled in the art or the disclosure of another reference. *Titanium Metals Corp. v. Banner*, 778 F.2d 775, 780, 227 U.S.P.Q. 773, 777 (Fed. Cir. 1985).

Claims 1, 4 and 5 stand rejected under 35 U.S.C. § 102(e) as being allegedly anticipated by Hu (U.S. Patent Application Publication No. 2003/0001266, hereinafter

“Hu”). The Examiner states that Hu discloses all of the elements of the abovementioned claims, primarily in FIGS. 1A-1F and paragraphs 0004, 0022, 0026-0029 and 0041.

More specifically, the Examiner alleges on page 3 of the Detailed Action that Hu discloses a diffusion barrier layer [115] formed on the substrate [105]. However, Hu more accurately discloses the diffusion barrier layer [115] on substrate [105] with a dielectric layer [110] therebetween.

Hu does not teach or suggest a diffusion barrier layer formed **directly** on the substrate, as recited in amended independent claim 1. Thus, it is respectfully submitted that claim 1, including claims depending therefrom, i.e., claims 2-5, define over Hu for at least this reason.

In addition, the Examiner alleges on page 3 of the Detailed Action that Hu discloses the copper alloy layer [120] including a material from about 0.5at% to about 15at% which is used to form the diffusion barrier layer at paragraphs [0026-0029]. However, it is respectfully noted that Hu at best merely discloses that “the agglomeration control layer 120 contains an early transition metal alloy of the form MT_x , where M is a first metal component, T is a Group IIIA or Group IVA transition metal and x is the atomic fraction of T.” [paragraph 0027]. Further, paragraph [0029] of Hu discloses that “[t]he agglomeration control layer 120 is rich in the first metal component, i.e., the atomic ratio of the first metal component to the second metal component is **greater than one**. For better adhesion to the subsequent metal layer, the atomic ratio of the first metal component to the second metal component in the agglomeration control layer 120 is preferably greater than **two**.” (Emphasis added.) Hu does not disclose that a composition ratio of a metal of a copper alloy which is about 0.5at% to about 15at%, and does not disclose that a copper alloy layer contains a same material which is contained in the diffusion layer.

Hu does not teach or suggest a copper alloy layer formed on the diffusion barrier layer, the copper alloy layer including a material from about 0.5at% to about 15at%, which is used to form the diffusion barrier layer, as recited in amended independent claim 1. Thus, it is respectfully submitted that claim 1, including claims depending therefrom, i.e., claims 2-5, define over Hu for at least this reason.

Accordingly, Applicants respectfully request that the Examiner withdraw the rejections to claims 1, 4 and 5 under 35 U.S.C. §102(e).

Rejections Under 35 U.S.C. § 103

In order for an obviousness rejection to be proper, the Examiner must meet the burden of establishing that all elements of the invention are disclosed in the prior art; that the prior art relied upon, coupled with knowledge generally available in the art at the time of the invention, must contain some suggestion or incentive that would have motivated the skilled artisan to modify a reference or combined references; and that the proposed modification of the prior art must have had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988); *In re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970); *Amgen v. Chugai Pharmaceuticals Co.*, 927 U.S.P.Q.2d, 1016, 1023 (Fed. Cir. 1996). See MPEP 2143. Claims 3, 4, 8 and 9 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Suzuki in view of Applicants' prior art (FIG. 3).

Claim 2 stands rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Hu in view of Farrar (U.S. Patent Application Publication No. 2002/0182858, hereinafter "Farrar"). The Examiner states that Hu discloses all of the elements of claim 2 except, *that the diffusion barrier layer comprises a silicide compound including at least one selected from the group consisting of Zr, Ti, Hf, V, Ta, Ni, Cr, Nb, Co, Mn, Mo, W-Rh, Pd and Pt*, which the Examiner further states is disclosed primarily in paragraph 0038 of Farrar.

First, it is respectfully pointed out that claim 2 depends from claim 1, which is submitted as being allowable for defining over Hu as discussed above. Second, it is respectfully submitted that use of *the diffusion barrier layer comprising a silicide compound including at least one selected from the group consisting of Zr, Ti, Hf, V, Ta, Ni, Cr, Nb, Co, Mn, Mo, W-Rh, Pd and Pt* or any other disclosure of Farrar does not cure the deficiencies noted above with respect to Hu.

Claim 3 stands rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Hu in view of Krivokapic (U.S. Patent No. 6,888,198, hereinafter "Krivokapic"). The Examiner states that Hu discloses all of the elements of claim 3 except, *that the thickness of the diffusion barrier layer is from about 50 angstroms to about 5000 angstroms*, which the Examiner states is disclosed primarily in FIG. 1 and column 5, lines 14-18 of Krivokapic.

First, it is respectfully pointed out that claim 3 depends from claim 1, which is submitted as being allowable for defining over Hu as discussed above. Second, it is respectfully submitted that use of *that the thickness of the diffusion barrier layer is from about 50 angstroms to about 5000 angstroms* or any other disclosure of Krivokapic does not cure the deficiencies noted above with respect to Hu.

Thus, Applicants submit that neither Hu, Farrar nor Krivokapic, either alone or in combination, render obvious the subject matter of amended claim 1. Claims 2-5 depend from amended claim 1, and thus includes the allowable elements of amended claim 1. It is thus believed that the dependent claims are patentable over the cited references for at least the reasons given above for amended independent claim 1.

Accordingly, it is respectfully submitted that the claimed invention is allowable over the cited references. The Examiner's withdrawal of the rejection of claims 1-5, and their subsequent allowance are respectfully requested.

Conclusion

In light of the above remarks, the present application including claims 1-5 are believed to be in condition for allowance.

Accordingly, Applicants respectfully request that the Examiner reconsider and withdraw the outstanding rejections. If there are any charges due with respect to this response, please charge them to Deposit Account No. 06-1130 maintained by Applicants' Attorneys.

Respectfully submitted,

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